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ABSTRACT

This report presents a summative evaluation of the first 3 years of the program of Knotts Environmental Science School in the Kansas City School District, Missouri. The school, which serves students in kindergarten through grade 5, began operation in 1988. The report focuses on the enrollment goals; the implementation of the program; the 1990-91 Iowa Tests of Basic Skills (ITBS) and Missouri Mastery and Achievement Test (MMAT) achievement scores; and perceptions of students, parents, and school staff toward the program. Site visits, classroom observations, and field trip and activity records reveal that the magnet theme (environmental science) is being infused in classroom and other activities. Achievement test scores appear in tables 8-10, along with clarifying information. The program perceptions of students and parents were very positive, while the teachers' perceptions were mixed. These responses are portrayed in tables 11-13. Included in the study is a comparison of third- to fifth-grade students from Knotts and a demographically similar traditional school. Problem areas cited by a large minority of teachers included problems with field trips, science resource teacher support, and dissatisfaction with discipline. Concluding recommendations emphasize: (1) the importance of teacher inservice opportunities; (2) an exploration of the dissatisfaction with the field trip process; (3) the need for the formulation of a discipline plan; (4) administrative and instructional staff recommendations for and implementation support of changes stemming from the results of classroom observation data; and (5) administrative support in the utilization of standardized test results. (MCO)

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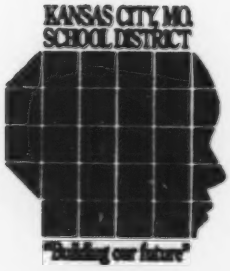
Summative Evaluation
of the
Knotts Environmental Science
Magnet Elementary School

1988-1989
1989-1990
1990-1991

Evaluation Office

The School District of
Kansas City, Missouri



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Summative Evaluation of the Knotts Environmental Science Magnet Elementary School

1988-1989
1989-1990
1990-1991

Margaret Seever
Program Evaluator

August 1991

Evaluation Office
Desegregation Planning Department
The School District of Kansas City, Missouri

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Executive Summary

The Knotts Environmental Science School began operation in the summer of 1988. The program serves students in grades kindergarten through grade five. This report is a summative evaluation of the program's first three years. The report focuses on the enrollment goals, the implementation of the program, the 1990-91 Iowa Tests of Basic Skills (ITBS) and Missouri Mastery and Achievement Test (MMAT) achievement scores, and the perceptions of students, parents, and school staff toward the program.

Demographic data summarized as of September 1990 show that Knotts, which began as a predominantly minority school, met its goal of approaching a 60/40 minority to non-minority split by at least 2% at each grade level, with the exception of kindergarten which, already approaching the desirable 60/40 ratio in 1990 with 63% minority dropped by one percentage point to 62% minority.

Site visits to Knotts revealed ample visible evidence of the implementation of the magnet theme. This evidence included such things as aquariums, animals (live and preserved), photographs, posters, mobiles, student work, etc. in the hallways and classrooms. Additional evidence of implementation was Knotts students' participation in numerous theme related field trips and activities. Classroom observations revealed that the theme is being infused across the curriculum with percent of class time spent on theme-related activities ranging from 47% in social studies to 78% in math.

On the 1991 ITBS, Knotts students scored at or above the national norm (the 50th percentile) on all subtests in kindergarten and on all subtests except reading at first and second grade. Third grade students scored at or above the norm in language and science, while fourth and fifth grade students scored at or above the norm only in science. While scores have gone down in every subject since 1990 in kindergarten and third grade and in every subject except social studies in first grade, fifth grade scores have gone up in every subject area. The greatest increases were in reading (from the 25th to the 39th percentile rank) and in science (from the 44th to the 51st percentile rank). Science is the only subject area in which students scored at or above the norm across all grade levels. Since 1988, the spring before the environmental science theme was implemented, there have been increases at all grade levels and in all subjects with the exception of first grade reading, second grade language, and fourth grade math and language. The greatest gains across all grade levels since 1988 have been in science with percentile raises averaging 22 and ranging from 15 in fourth grade to 39 in second grade. Scores

also increased across all other subjects since 1988 with kindergarten and third grade scores rising most over the time period since theme implementation, averaging 16 percentile point increases across subjects. Second and fifth grades followed closely behind averaging 12 percentile point increases across subjects. ITBS scores for 1991 were compared to a randomly selected sample of students from the district's traditional schools. Knotts students' scores were statistically significantly higher at the .05 level in kindergarten math and language, in first grade language, science, and social studies, and in second grade science. Knotts scores were statistically significantly lower at the .05 level in fourth grade math and social studies.

On the MMAT, Knotts scores are comparable with the Kansas City, Missouri School District (KCMSD) in math, but weak in the areas of reading/language arts, science, and social studies. Compared with the state, Knotts is weak in reading, math, science, and social studies. Since 1990, Knotts scores fell slightly in all subject areas except math. Overall, since the 1988 magnet theme implementation, reading scores fell by 2 points while social studies, math, and science scores rose by 14, 24, and 39 points respectively.

The perceptions of parents were very positive with 100% saying that, overall, they were satisfied with the school. A great majority of parents self-reported high involvement with their child's education and the school and high levels of satisfaction over areas related to the school, the magnet application process, and district provided transportation. Student perceptions were also very positive with large majorities of students responding that they not only liked the program and were learning about most facets of it, but also that they were putting into practice many of the environmentally sound behaviors that they had learned. Comparison of third to fifth grade students from Knotts and a demographically similar traditional school supported other data that the environmental science theme was being implemented and suggested that students were being impacted by the program through changes in knowledge, attitudes, and behaviors that are more environmentally sound. Responses by teachers were mixed. On the positive side, more than one-half of all teachers responded positively to all items. Over 90% of teachers said they were committed to the theme, that they believed the principal was providing the support necessary for theme implementation, that they were familiar with the goals and objectives of the school planning outline and that the school was implementing the theme according to those goals and objectives. There were some problem areas cited by a relatively large minority of teachers including problems with the field trips, a belief that science

resource teachers were not providing the support the teachers felt they needed to implement the theme, and a dissatisfaction with the discipline.

There is evidence that the Knotts Environmental Science School has made progress in spite of difficult circumstances and problems in its first three years. There are many signs of successful implementation including visible evidence in displays, theme-oriented field trips and activities, positive perception reports from parents, students, and teachers, and achievement score gains over the three years. Specific recommendations based on the data gathered are contained at the end of this report.

SUMMATIVE EVALUATION OF THE KNOTTS ENVIRONMENTAL SCIENCE MAGNET ELEMENTARY SCHOOL

1988-1991

Introduction

The Knotts School for Environmental Science began operation during the 1988 summer session. According to the *Long Range Magnet Plan* (Hale & Levine, 1986), there should be two years of formative evaluation before a summative evaluation is done in year three. Knotts having completed its third year of operation, this report will be summative. The report first addresses the regular school program, summarizing student demographics, implementation information, achievement data, and perceptions of school staff, parents, and students. Demographic, implementation, and perception data are then presented for the Extended Day Program. A final section draws conclusions about the overall program and makes recommendations based on the data summarized in the report.

Program Description

The Knotts School for Environmental Science serves students in grades kindergarten through grade five. The school began operation in 1988-89 at the original Knotts site. Shortly before the end of the first semester the school was temporarily moved to another building, Seven Oaks, pending construction of its permanent building on a 64 acre site adjoining Swope Park. Knotts continued to operate in the Seven Oaks building in 1990-91.

The school infuses its environmental science magnet theme into the district's core curriculum. Its mission is encapsulated in the following statement taken from its Planning Outline (Knotts Environmental Science Task Force, 1988):

> The staff at Knotts is concerned with improving the quality of the environment. To receive maximum benefits from our environment, we must learn to live in harmony with one another and to use our resources wisely. The Environmental Science Magnet will provide an appreciation and understanding of environmental and natural processes upon which life depends. Emphasis will be placed on integrating the environmental theme into the total curriculum. Students will learn by doing: conducting experiments in a laboratory, growing and observing plants in a greenhouse, experiencing early life in a log cabin, attending special programs in the school amphitheater and participating in camping and field trips. Knotts is committed not only to the academic gains of its students but also to multicultural education.

The environmental science curriculum at Knotts is based on objectives organized into two major sections, the first divided into five units and the second divided into four units. Following is an outline of the two curricular sections and the corresponding units that compose each:

I. The Living Environment

A. Ecology: The interaction of organisms and their environment
B. Characteristics of producers and decomposers
C. Characteristics of consumers
D. Communities past and present
E. Health

II. The Physical Environment

A. Earth science
B. Matter: The material of the universe
C. The environment and the universe
D. Energy and environment

Evaluation Design

The following questions were used to focus information collected for this report:

1. What is Knotts' enrollment breakdown by grade and minority/non-minority status?
2. What progress has been made in implementing the environmental science theme?
3. What are the perceptions of administration, faculty, support staff, students, and parents regarding the current school year?
4. What are Knotts' achievement scores on the MMAT and ITBS?

Student enrollment data for 1987-88, 1988-89, 1989-90 and 1990-91 were obtained from the district's Research Office. These data were taken from reports prepared by that office at the same point each year, late September, to help ensure comparability among years. Implementation data were obtained from observations conducted by the Evaluation Office, a teacher questionnaire, interviews and discussions with school staff, and documents provided by the school. Teacher, administration, support staff, student, and parent perceptions were measured using questionnaires administered toward the end of the school year. Information reported about Knotts curriculum, goals, or objectives was obtained from the Knotts Planning Outline (Knotts Environmental School Task Force,1988).

Results and Discussion

Demographics

Table 1 reports for each grade level the environmental science program capacity at Knotts as used by the district Admissions Office for student placement, the actual enrollment as reported by the district Research Office, the difference between the two figures, and the percent of the capacity that was filled. Grades one, two, and five were under capacity, being four to eight students short (translating to 88%, 94%, and 95% capacity respectively). Kindergarten and grade three were under capacity by seven and 15 students (translating to 84% and 83% of capacity respectively). Grade four had one student over, or 101% of capacity. Overall, the school was filled to 91% capacity with 389 students out of a 426 student capacity.

Enrollment data for 1987-88, 1988-89, 1989-90, and 1990-91 are contained in Table 2. Because Knotts was a predominantly minority school in 1987-88, the year prior to becoming a magnet school, its enrollment goal was to reach a 60/40 minority/non-minority ratio or to increase non-minority enrollment by at least two percent at each grade level to closer approach that goal. Table 2 shows that Knotts accomplished this goal at every grade level except kindergarten, which decreased minority enrollment by one percent from last year to 62% and now is within 2% of the 60% minority/40% non-minority goal.

Implementation

Staff Development/Inservice. Table 3 presents teacher responses to items on a spring 1991 questionnaire concerning staff development/inservice. Eighty-six percent of 27 teachers

Table 1

Percent of Enrollment Capacity Filled for Knotts Environmental Science Program 1990-1991

Grade	Program Capacity[1]	Actual Enrollment[2]	Difference	% of Capacity
K	44	37	- 7	84%
1	66	58	- 8	88%
2	66	62	- 4	94%
3	88	73	- 15	83%
4	81	82	+ 1	101%
5	81	77	- 4	95%
Total	426	389	-37	91%

[1] Program capacity utilized by the Admissions Office when placing students in magnet programs.

[2] From *September 26, 1990 Student Membership Report* (Research Office, 1990).

Table 2

Knotts Minority and Non-Minority Enrollment by Grade Level for School Years 1987-1988, 1988-1989, 1989-1990, and 1990-91

	1987-1988				1988-1989				1989-1990				1990-1991			
	Minority		Non-Minority		Minority		Non-Minority		Minority		Non-Minority		Minority		Non-Minority	
Grade	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
K	100%	(46)	0%	(0)	98%	(58)	2%	(1)	63%	(19)	37%	(11)	62%	(23)	38%	(14)
1	100%	(67)	0%	(0)	96%	(46)	4%	(2)	88%	(51)	12%	(7)	79%	(46)	21%	(12)
2	100%	(72)	0%	(0)	89%	(49)	11%	(6)	84%	(41)	16%	(8)	81%	(50)	19%	(12)
3	99%	(76)	1%	(1)	89%	(67)	11%	(8)	86%	(70)	14%	(11)	80%	(58)	20%	(15)
4	97%	(64)	3%	(2)	88%	(71)	12%	(10)	87%	(66)	13%	(10)	79%	(65)	21%	(17)
5	98%	(57)	2%	(1)	83%	(52)	17%	(11)	86%	(67)	14%	(11)	78%	(60)	22%	(17)
Total	99%	(382)	1%	(4)	90%	(343)	10%	(38)	84%	(314)	16%	(58)	78%	(302)	22%	(87)
Grand Total		**386**				**381**				**372**				**389**		

Note: Enrollment figures provided by the Kansas City, Missouri School District's Research Office.

Table 3

Knotts Teacher Questionnaire Responses to Staff Development/Inservice Items
Spring 1991

Item		Response Alternatives	(N = 27)
1.	How often were you able to apply in your classroom information from inservice related to theme implementation and infusion	Very Frequently Often Seldom Never	56% 30% 15% 0%
2.	How satisfied have you been with the staff development and inservice sessions regarding the environmental science theme?	Very Satisfied Satisfied Dissatisfied Very Dissatisfied	59% 33% 7% 0%
3.	How satisfied have you been with the staff development and inservice sessions regarding the district's core curriculum?	Very Satisfied Satisfied Dissatisfied Very Dissatisfied	50% 23% 27% 0%
4.	Do want additional inservice to:		
	a. help with environmental science theme infusion	Yes	82%
	b. increase knowledge of environmental science	Yes	78%
	c. learn about more effective discipline	Yes	59%
	d. increase effectiveness of instruction	Yes	48%
	e. increase knowledge about use/application of computers	Yes	41%
	f. increase knowledge about careers related to the theme.	Yes	30%

responding stated that they were able to apply information from theme-related inservice in their classrooms very frequently or often (item 1). Asked about their satisfaction with staff development/inservice, 92% of the teachers were satisfied or very satisfied with theme-related inservice (item 2) while 73% of the teachers stated they were satisfied or very satisfied with sessions regarding the district's core curriculum or non-theme related courses (item 3). Item four defines areas over which teachers said they wanted more inservice. These included sessions designed to help with theme infusion (82%), increase knowledge of environmental science (78%), learn about more effective discipline (59%), increase effectiveness of instruction (48%), increase knowledge about use/application of computers (41%), and increase knowledge about careers related to the theme (30%).

Visible evidence of the magnet theme. The Environmental Science theme would be immediately obvious to even the casual observer entering the Knotts building. Observations

were conducted in hallways and classrooms in the fall and spring to document visible evidence of the magnet theme. In addition to the art and music classrooms, one classroom was randomly selected from each grade level both semesters. On the average there were 140 displays per classroom in the spring. Individual hallways had counts of greater than 75 displays on each check. Displays were found in 100% of the rooms visited with a range of 61 to 185 displays in any single room. There were many types of theme-related displays including posters, plants, aquariums, models, photographs, student work (from all subject areas), animals (live and preserved) and terrariums. Displays most frequently dealt with wildlife, followed by insects, plants, meteorology, ocean life, and recycling/ecology. Follow-up checks of the eight selected classrooms seven weeks later revealed that many displays had been changed to fit the content being covered and that displays of a more permanent nature (e.g., aquariums) were kept up and enhanced. There was also visible evidence of theme implementation on the school grounds through student gardening and landscaping efforts.

Knotts materials, facilities, and grounds. Teachers were asked about their satisfaction with and use of the Knotts grounds and facilities. Their responses to these questionnaire items are presented in Table 4. Sixty-six percent of responding teachers stated that they were very satisfied or satisfied with the Knotts buildings, grounds, etc. (item 1). Asked to what degree their students use the school grounds for environmental study 56% said to a good or great degree, 28% said to some degree, and 16% said not at all (item 2). Seventy-six percent of responding teachers stated that they believe the Learning Resource Center (LRC) is well equipped for study of environmental issues by students and/or faculty (item 3). Asked about frequency of use of the LRC, 41% said they use it often or very frequently themselves to prepare for class or become more informed about the theme and 73% said their students use the LRC to study environmental science (items 4 and 5 respectively). Fifty-six percent of teachers responding said that their students use the botany lab/greenhouse to a great or good degree (item 6), while 38% said they have their students make use of the weather station to a great or good degree (item 7). In November of 1990, teachers were asked to respond to the statement "I am comfortable with my knowledge of computers and their use in the classroom." Sixty-four percent agreed or strongly agreed with that statement, while 35% disagreed or strongly disagreed (item 8). Teachers were asked in spring about their students' use of computers for various purposes. Sixty-four percent stated their students used computers to a good or great degree to reinforce basic skills, while 32% said to some degree, and 5% said not

Table 4

Knotts Teacher Questionnaire Responses to Items Concerning Materials, Facilities, and Grounds Spring 1991

Item		Response Alternatives	(N = 27)
1.	How satisfied have you been with the adequacy of the Knotts facilities (i.e. buildings, grounds etc.)?	Very Satisfied	22%
		Satisfied	44%
		Dissatisfied	30%
		Very Dissatisfied	4%
2.	To what degree during the year do your students use the school grounds for environmental study?	To a Great Degree	24%
		To a Good Degree	32%
		To Some Degree	28%
		Not At All	16%
3.	Do you believe the Learning Resource Center is well equipped with newspapers, periodicals, books, and other materials for study of environmental issues by students and/or faculty?	Yes	76%
		No	24%
4.	How often do you use the LRC to prepare class materials, become more informed about the theme, etc.?	Very frequently	26%
		Often	15%
		Some	44%
		Seldom	15%
		Never	0%
5.	To what degree during the year do your students use the library/LRC for study of environmental science?	To a Great Degree	35%
		To a Good Degree	38%
		To Some Degree	19%
		Not At All	8%
6.	To what degree during the year do your students use the greenhouse/botany lab?	To a Great Degree	17%
		To a Good Degree	39%
		To Some Degree	26%
		Not At All	17%
7.	To what degree during the year do you have students make use of the weather station?	To a Great Degree	19%
		To a Good Degree	19%
		To Some Degree	24%
		Not At All	38%
8.*	I am comfortable with my knowledge of computers and their use in the classroom.	Strongly Agree	20%
		Agree	44%
		Disagree	27%
		Strongly Disagree	8%
9.	To what degree do you have students use computers to reinforce basic skills in math, reading, etc?	To a Great Degree	32%
		To a Good Degree	32%
		To Some Degree	32%
		Not At All	5%

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Table 4 (continued)

Knotts Teacher Questionnaire Responses to Items Concerning Materials, Facilities, and Grounds Spring 1991

Item		Response Alternatives	(N = 27)
10.	To what degree do you have students use computers to enhance learning in the environmental theme?	To a Great Degree To a Good Degree To Some Degree Not At All	37% 26% 32% 5%
11.	To what degree do you have students use computers to teach or improve student computer literacy?	To a Great Degree To a Good Degree To Some Degree Not At All	28% 39% 28% 6%
12.	In general, have you been able to get the materials and supplies necessary to teach the environmental science theme?	Yes No	89% 11%
13.	In general, have you been able to get the materials and supplies necessary to teach the district's core curriculum?	Yes No	96% 4%

*From questionnaire administered in November, 1990.

at all (item 9). Sixty-three percent said they had their students use computers to enhance instruction in the environmental science theme to a good or great degree, 32% said to some degree, and 5% said not at all (item 10). Asked to what degree they had their students use computers to teach or improve student computer literacy, 67% said to a good or great degree, 28% said to some degree, and 6% said not at all (item 11). Eighty-nine percent of the teachers responding stated that they were able to get the materials and supplies necessary to teach the environmental science theme, while 96% said they were able to do so for the non-theme related or core-curriculum courses.

Field trips and theme-related activities. Another indicator of magnet theme related activity is the number and type of field trips. A review of field trips by Knotts' students revealed that excursions were made to 21 locations during 1990-91, with some locations visited by more than one group. A perusal of the field trip destination list presented in Table 5 shows that the great majority of the experiences appear to be theme related. Kindergartners and second graders went on six field trips, first graders on seven, third graders and fourth graders went on nine excursions, and fifth graders on eleven. Kindergartners, first, second, and third graders

Table 5

Knotts Field Trip Destinations in 1990-91

Blue River	Meservey School	Research Medical Center
Burr Oak Woods	Missouri Backpack/Camp Trip	Rotary Camp
Exchange City	Missouri River Boat	South Dakota Trip
Folly Theatre	Music Hall	Southwest High School
Kansas City Zoo	Nebraska/Iowa Trip	Topeka Zoo
Knotts' New School Site	New Gladstone School	Truman Lake
K.U. Museum of Natural History	Pitcher School	Wilson Lake

each camped out once during the year, while fourth and fifth graders camped out twice, with one group of 10 fifth graders participating in a third campout. The school has also participated in many theme related activities throughout the year including the Knotts fall environmental festival, a water conservation activity, planting and landscaping activities, a television special appearance on clean air and water conservation, a school-wide science fair, the city-wide science and engineering fair, the magnet school fair, a career awareness day, and earth day activities. Students were involved in recycling projects for paper and aluminum cans throughout the school year. Environmental experts Nick Natarella and Diane Hardiman gave a series of lectures and demonstrations that were theme related in October, November, and January.

Teacher reported theme infusion. Responses to implementation-related items on a questionnaire administered in the spring are contained in Table 6. All teachers said that they infused the theme to at least some degree in reading, language arts, math, and social studies. The greatest degree of infusion was reported in social studies and language arts with 95% and 92% respectively saying that they infused the theme to a good or great degree in those areas. The lowest reported degree of infusion was in math with 67% saying they infused the theme to a good or great degree.

Classroom observations. Sixty classroom visits of 25 or 30 minutes each were made during the fall and winter of 1990-91 for a total of 1,419 minutes of observation time. Visits were unannounced and classes from across the curriculum were randomly selected across all grade levels and school periods. An attempt was made to time visits to make observation periods lie several minutes after the beginning and before the end of classes to observe more instructional and less organizational time. Hands-on learning and activities designed to improve problem-solving and critical thinking skills are important to the environmental

Table 6

Knotts Teacher Report of Infusion of the Environmental Science Theme in Other Content Areas in Spring 1991

Content Area	Not at All	To Some Degree	To a Good Degree	To a Great Degree
Reading (N= 24)	0%	17%	38%	46%
Language Arts (N= 24) (Spelling, English, Writing)	0%	8%	42%	50%
Math (N= 24)	0%	33%	29%	38%
Social Studies (N= 20)	0%	5%	50%	45%
Art/Music/PE (N= 16)	0%	13%	38%	50%

Note: Teachers were asked to respond for areas in which they instruct.

science theme according to both the *Knotts Planning Outline* (Knotts Environmental Science Task Force, 1988) and the *Long Range Magnet Plan* (Hale & Levine, 1986). Classroom activities or processes involving these critical facets were observed during 37% of the total minute units of observation. They did not have to be theme-centered to be counted, however a large majority of them were observed during activities that were theme-related. Infusion of the theme was observed on 90% of the visits with theme-centered activity occurring approximately 65% of the total time in minutes. The reader is cautioned to be aware that there is no definitive "correct" or "optimal" amount of time for either incorporation of critical thinking skill related activities or infusion of a high-interest theme. The problem in this specific case is compounded by the ambiguity involved in defining and distinguishing between which minute-by-minute activities constitute the teaching of problem solving or critical thinking and where to draw the line between infusion/inclusion of "science" or "social studies" topics in general and "environmental science," a sub-area encompassing parts of both of those disciplines and which could have a more narrow scope including only such things as ecology, recycling, etc. A relatively broad interpretation of environmental science was used to define all theme-related activities recorded during classroom observations and for general purposes throughout this report. As can be seen in Table 7, there was a marked difference across various subjects for both incorporation of the hands-on/critical thinking processes and theme infusion. Infusion of the theme was observed to the greatest extent in math and science classes (with 78% and 69% of the time in minutes respectively). Theme infusion was also observed in reading/language arts and social studies classes with 58% and 47% of the time spent on theme-related activities in those classes. It is interesting to note at this point that these data are in direct opposition to

the degree of infusion self-reported by teachers, as discussed in the previous section and shown in Table 6. Teachers self-report the greatest infusion in reading, language arts and social studies and the least in math, but observations suggest that infusion time in the classroom was the opposite with the greatest time spent infusing the theme into math and the least amount of time in reading/language arts and social studies. It is possible that differences exist between individual teacher's definitions of "infusion activities" and/or what constitutes greater and lesser degrees of theme infusion. To some teachers infusion in a subject area once a week may be personally defined as infusion to a great degree, whereas to another infusion on a daily basis is their criterion, and to a third teacher only infusion over a large part of each class session is believed to be a great deal of infusion. Critical thinking/problem solving and hands-on activities are reported separately in Table 7 and also in combination. Many hands-on activities could also have been recorded as minutes with critical thinking/problem solving activities. The

Table 7

Knotts Classroom Data Reporting Observed Infusion of Theme, Hands-On Activities, and Critical Thinking/Problem Solving 1990-91

	Science	Math	Reading/ Language	Social Studies
Total Minutes Observed	650	310	309	150
Infusion				
% of Visits Observed	100%	85%	79%	83%
% of Total Minutes Observed	69%	78%	58%	47%
Critical Thinking/ Problem Solving,				
% of Visits Observed	41%	23%	36%	17%
% of Total Minutes Observed	6%	3%	11%	1%
Hands-On Activities				
% of Visits Observed	74%	54%	64%	50%
% of Total Minutes Observed	25%	10%	35%	13%
Crit.Thinking/Prob. Solv./Hands-On Combination				
% of Visits Observed	22%	31%	29%	17%
% of Total Minutes Observed	4%	16%	14%	3%
Theme-Related Career Infusion				
% of Visits Observed	44%	31%	14%	50%
% of Total Minutes Observed	5%	10%	2%	6%

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combination category allows the total time in minutes to remain at 100%. Critical thinking/problem solving activities were observed in reading/language arts, science, math, and social studies classes for 11%, 6%, 3%, and 1% of the time in minutes respectively. These processes were observed in conjunction with hands-on activities in math, reading/language arts, science, and social studies classes for 16%, 14%, 4%, and 3% of the total minutes respectively. Hands-on activities were recorded for 35%, 25%, 13%, and 10% of the minutes for reading/language arts, science, social studies, and math respectively.

Achievement

ITBS. A summary of ITBS scores since 1988, displayed in Table 8, shows that Knotts students scored at or above the national norm (the 50th percentile) on all subtests in kindergarten and on all subtests except reading at first and second grade. Third grade students scored at or above the norm in language and science, while fourth and fifth grade students scored at or above the norm only in science. While scores went down across all subjects in kindergarten and third grade and in every subject except social studies in first grade, fifth grade scores went up in every subject area. The greatest increases were a 14 percentile point increase in reading (from the 25th to the 39th percentile rank) and a seven percentile point increase in science (from the 44th to the 51st percentile rank). Science is the only subject area in which students scored at or above the norm across all grade levels. Since 1988, the spring before the environmental science theme was implemented, there have been increases at all grade levels and in all subjects with the exception of first grade reading, second grade language, and fourth grade math and language (dropping five, one, two, and two percentile points respectively). The greatest gains across all grade levels since 1988 have been in science with percentile raises averaging 22 and ranging from 15 in fourth grade to 39 in second grade. This increase in science scores since the environmental science theme was initiated may be evidence of successful implementation. Scores also increased across all other subjects since 1988 averaging ten, nine, eight, and seven percentile point increases respectively in math, social studies, language, and reading. Kindergarten and third grade scores have risen most since theme implementation, averaging 16 percentile point increases across subjects. Second and fifth grades followed closely behind averaging 12 percentile point increases across subjects. First grade averaged a nine percentile point increase across subjects, while fourth grade showed the smallest increase with five percentile points on the average. Looking at minority/non-minority score patterns, minority students' scores in spring 1991 were higher in all subjects except social studies at first

Table 8
Knotts Iowa Tests of Basic Skills (ITBS) Scores Presented as Percentile Ranks
1988-1991

Grade	1987-88			1988-89			1989-90			1990-91			
Subject	Minority	Non-Minority	Total	Minority	Non-Minority	Total	Minority	Non-Minority	Total	Minority	Non-Minority	Total	District 1991
Kindergarten													
Reading	79	**	79	83	74*	83	93	97	95	-	-	-	-
Math	66	**	66	77	**	76	92	95	93	79	86	81	64
Language	58	**	58	65	43*	64	77	87	81	69	87	75	61
Science	-	-	-	-	-	-	-	-	-	-	-	-	-
Social Studies	-	-	-	-	-	-	-	-	-	-	-	-	-
First													
Reading	54	**	53	63	41*	61	60	87*	64	49	37	48	53
Math	54	**	53	66	84*	67	62	89*	66	66	58	64	65
Language	79	**	78	82	61*	81	78	94*	80	80	76	79	73
Science	61	**	60	80	68*	79	82	96*	84	78	76	78	67
Social Studies	75	**	74	76	73*	75	78	90*	79	84	85	85	78
Second													
Reading	43	**	43	47	56*	48	45	56	48	43	65	47	50
Math	44	**	45	46	69*	50	42	50	43	60	64	60	64
Language	55	**	57	65	51*	63	55	78*	60	55	63	56	64
Science	23	**	25	63	81*	60	44	67	49	61	77	64	58
Social Studies	61	**	62	62	75*	64	42	68	49	62	72	64	69

Table 8 (continued)
Knotts Iowa Tests of Basic Skills (ITBS) Scores Presented as Percentile Ranks
1988-1991

Grade / Subject	1987-88 Minority	1987-88 Non-Minority	1987-88 Total	1988-89 Minority	1988-89 Non-Minority	1988-89 Total	1989-90 Minority	1989-90 Non-Minority	1989-90 Total	1990-91 Minority	1990-91 Non-Minority	1990-91 Total	1990-91 District 1991
Third													
Reading	26	**	26	31	58*	33	32	49	35	31	46	33	44
Math	25	**	25	31	57*	34	37	66	43	32	45	34	48
Language	38	**	38	50	62*	51	58	65	59	56	60	57	57
Science	28	**	28	49	75*	52	52	66	55	50	58	51	59
Social Studies	26	**	26	39	72*	41	54	73	58	46	42	46	56
Fourth													
Reading	22	**	23	26	40*	27	27	51	30	27	36	29	39
Math	33	**	33	31	33*	31	32	48	34	27	47	31	45
Language	43	**	43	40	42*	40	39	45	40	42	40	41	49
Science	37	**	38	38	52*	39	50	70	53	53	56	53	55
Social Studies	29	**	30	33	51*	35	32	52	35	34	46	36	52
Fifth													
Reading	23	**	24	34	41	35	25	26	25	37	45	39	40
Math	20	**	20	26	30	27	30	31	30	29	44	32	41
Language	35	**	35	41	44	41	44	31	42	45	43	45	48
Science	34	**	35	49	62	51	43	50	44	49	62	51	53
Social Studies	31	**	32	33	42	35	39	36	39	38	52	40	47

* Based on fewer than ten students

** No score presented because fewer than four students comprised the group

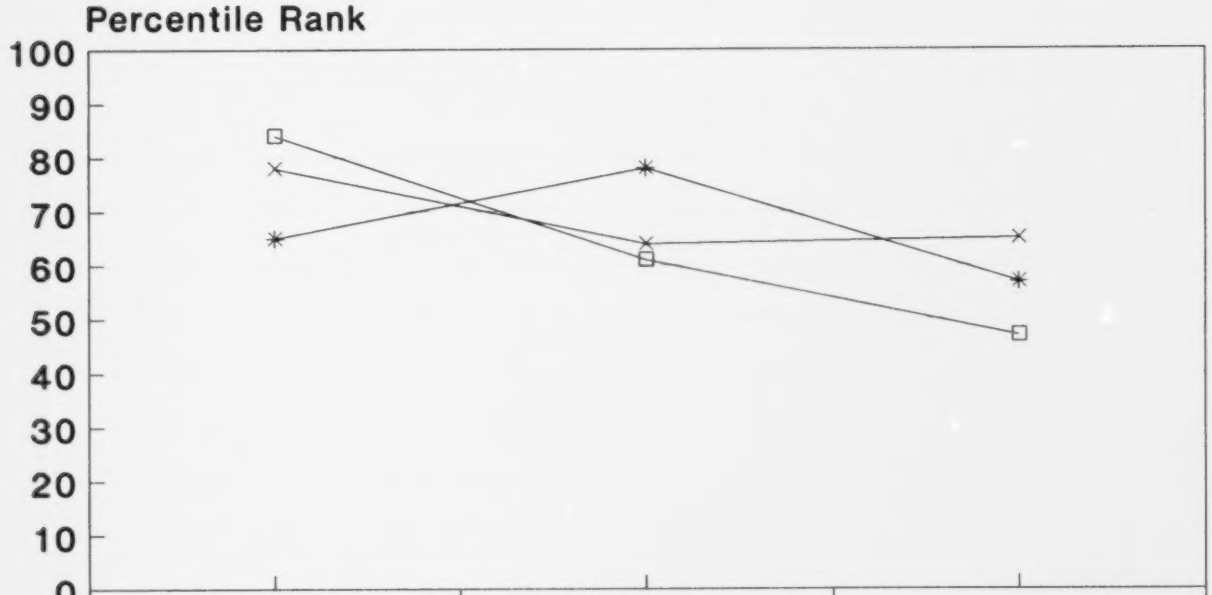
grade, in language at the fourth and fifth grades, and in social studies in third grade. In all other areas, non-minority scores were higher.

Reading, math, and language ITBS achievement scores for students who entered the program as kindergartners in 1988-89, have remained in the school, and who were second graders in 1990-91 are graphed in Figure 1. Knotts began as a predominantly minority school and there was only one non-minority student in the kindergarten cohort. Because a single student would not be representative of any group achievement pattern, Figure 1 shows only minority achievement over the time period. Reading scores have steadily declined since 1988-89 going from 84th percentile at the end of the first year of implementation to the 47th percentile rank in spring 1991. Math scores have also declined since 1988-89, falling from the 78th percentile rank to the 64th in spring of 1990 and rising slightly to the 65th percentile rank in spring 1991. Language scores rose between spring 1989 and spring 1990 from the 65th percentile rank to the 78th percentile rank, but fell in spring 1991 to the 57th percentile rank.

Knotts ITBS scores for 1991 were compared to a randomly selected sample of students from the district's traditional schools. In the analyses of kindergarten through second graders, mean grade equivalent scores were compared using Analysis of Variance . Third through fifth grade scores were compared using Analysis of Covariance after they had been statistically adjusted for pre-existing differences in ability using their third grade Cognitive Abilities Tests as covariates. This type of adjustment makes it possible to compare the scores of two or more groups even though the scores might not have been equivalent before the groups participated in different programs. The adjusted and unadjusted means were converted to percentile ranks and are presented in Table 9. Knotts students' scores were statistically significantly higher at the .05 level in kindergarten math and language, in first grade language, science, and social studies, and in second grade science. Knotts scores were statistically significantly lower at the .05 level in fourth grade math and social studies.

MMAT. Table 10 presents the third grade MMAT scores for Knotts, the Kansas City, Missouri School District (KCMSD), and the state of Missouri for 1987-88, 1988-89, 1989-90, and 1990-91. According to the *MMAT Guide to Score Interpretation and Use* (1991), meaningful strengths or weaknesses between groups of students can be determined using the average student error of measurement of 25. Using this criterion, Knotts scores are comparable to the KCMSD in math,but weak compared to the district in reading, science, and social studies. When compared with the state, Knotts is weak in reading, math, social studies, and science.

Figure 1
ITBS Minority Achievement Across Time
Kindergarten Cohort



	Kindergarten	First Grade	Second Grade
Reading	84	61	47
Math	78	64	65
Language	65	78	57

Note: Percentile ranks were converted from mean grade equivalent scores

Knotts Environmental Science, 1991

Table 9

Comparison of 1991 ITBS Reading, Math, Language, Science, and Social Studies Scores for Students at Knotts and Randomly Selected Traditional School Students

Test Grade Means	Knotts Percentile Rank	Traditional Percentile Rank	Probability Level
Reading			
Grade 1			
Unadjusted mean	47	49	.87
Grade 2			
Unadjusted mean	47	41	.32
Grade 3			
Unadjusted mean	35	40	
Adjusted mean	34	41	.11
Grade 4			
Unadjusted mean	29	36	
Adjusted mean	30	36	.09
Grade 5			
Unadjusted mean	38	41	
Adjusted mean	40	39	.85
Math			
Kindergarten			
Unadjusted mean	81	64	.03*
Grade1			
Unadjusted mean	65	55	.16
Grade 2			
Unadjusted mean	60	57	.50
Grade 3			
Unadjusted mean	34	43	
Adjusted mean	34	43	.08
Grade 4			
Unadjusted mean	31	46	
Adjusted mean	33	43	.01*
Grade 5			
Unadjusted mean	32	43	
Adjusted mean	36	39	.52

Table 9 (continued)

Comparison of 1991 ITBS Reading, Math, Language, Science, and Social Studies Scores for Students at Knotts and Randomly Selected Traditional School Students

Test Grade Means	Knotts Percentile Rank	Traditional Percentile Rank	Probability Level
Language			
Kindergarten			
Unadjusted mean	75	60	.01*
Grade 1			
Unadjusted mean	79	67	.04*
Grade 2			
Unadjusted mean	56	58	.76
Grade 3			
Unadjusted mean	58	54	
Adjusted mean	57	55	.63
Grade 4			
Unadjusted mean	44	50	
Adjusted mean	45	49	.31
Grade 5			
Unadjusted mean	45	47	
Adjusted mean	46	46	.79
Science			
Grade1			
Unadjusted mean	78	50	.00*
Grade 2			
Unadjusted mean	64	47	.00*
Grade 3			
Unadjusted mean	53	51	
Adjusted mean	53	51	.72
Grade 4			
Unadjusted mean	53	50	
Adjusted mean	54	50	.26
Grade 5			
Unadjusted mean	49	52	
Adjusted mean	50	51	.87

Table 9 (continued)

Comparison of 1991 ITBS Reading, Math, Science, Language, and Social Studies Scores for Students at Knotts and Randomly Selected Traditional School Students

Test Grade Means	Knotts Percentile Rank	Traditional Percentile Rank	Probability Level
Social Studies			
Grade 1			
Unadjusted mean	84	68	.00*
Grade 2			
Unadjusted mean	64	59	.41
Grade 3			
Unadjusted mean	47	44	
Adjusted mean	46	44	.67
Grade 4			
Unadjusted mean	36	52	.03*
Adjusted mean	37	51	
Grade 5			
Unadjusted mean	39	52	
Adjusted mean	40	49	.11

* Differences statistically significant at the .05 level.

Table 10

Third Grade Missouri Mastery and Achievement Test Scores (MMAT) for Knotts, the State, and the District in 1988-1991

	Reading/LA			Math			Science			Social Studies		
Year	Knotts	State	District	Knotts	State	District	Knotts	State	District	Knotts	State	District
1991	247	321	274	267	326	289	264	344*	290	255	336	286
1990	258	323	267	266	330	278	265	347	278	262	346	282
1989	264	328	275	250	323	275	273	344	282	273	337	284
1988	249	315	268	243	318	264	225	311	251	241	325	262

Examination of Table 10 reveals that since 1988 Knotts math, science and social studies scores have risen by 24, 39, and 14 points respectively, while reading scores have declined by two points.

Perceptions

Teachers. Responses of teachers to the perception items on a questionnaire administered near the end of the semester are summarized in Table 11 along with results of some of the same items on teacher questionnaires from the springs of 1989 and 1990. An examination of the responses shows that on all of the items one-half or more of the teachers responded positively. Items which elicited positive responses from at least 90% of the teachers included the following: one hundred percent of the teachers responding stated that they were committed to the theme to a good or great degree and that they engaged in more environmentally sound behaviors in their personal life as a result of knowledge gained through their experiences in an environmental science magnet school (items 7 and 18). Ninety-seven percent of teachers said they believed the principal was providing the support necessary to successfully implement the theme (item 8). Ninety-six percent stated that they were familiar with the goals and objectives of the Knotts planning outline and that they believed the environmental science and social studies objectives were clear at their grade level (items 3, 5, and 6). Ninety-three percent stated that they believed the school was implementing the theme in accordance with the identified goals and objectives and that disciplinary support of the principal was good or excellent (items 4 and 16). The items which elicited the least number of positive responses included the following: forty-six percent of the teachers said they did not believe their students participated in enough theme-related field experiences (item 1); 35% of responding teachers said they did not believe the science resource teachers provided the support they needed to successfully implement the theme (item 10); and 26% rated the discipline at Knotts as only fair or poor (item 15). The reported lack of field trips is inconsistent with data provided by the school showing a minimum of six camping or field trips were taken at each grade level.

When teachers were asked to list strengths of the program and hindrances to implementation, the strengths listed by at least 10% of the 26 teachers responding to the item included the following: 1) the teachers (50%); 2) the principal (50%); 3) the resource teachers (23%); and 4) the quality inservice (15%). Weaknesses or hindrances to implementation listed by at least 10% of the 22 teachers responding were: 1) the poor facilities at the temporary site (41%);

Table 11

Knotts Teacher Responses to Program Perception Items
1989- 1991

Items		Response Alternatives	1988-89	1989-90	1990-91
1.	In general, have your students participated in enough field experiences (field trips, outdoor activities, etc.) related to the environmental science theme?	Yes	44%	59%	54%
		No	56%	41%	46%
2.	How satisfied have you been with the quality of your students' field experiences?	Very Satisfied	20%	50%	43%
		Satisfied	44%	9%	35%
		Dissatisfied	24%	27%	13%
		Very Dissatisfied	12%	14%	9%
3.	I am familiar with the goals and objectives in the Knotts planning outline.	Strongly Agree	--	--	70%
		Agree	--	--	26%
		Disagree	--	--	4%
		Strongly Disagree	--	--	0%
4.	I believe our school is implementing the magnet theme according to the identified goals and objectives.	Strongly Agree	12%	22%	52%
		Agree	44%	44%	41%
		Disagree	28%	26%	7%
		Strongly Disagree	16%	9%	0%
5.	At your grade level, how clear are the environmental science objectives in identifying for you what should be taught?	Very Clear	21%	36%	48%
		Clear	67%	46%	48%
		Unclear	13%	18%	4%
		Very Unclear	0%	0%	0%
6.	At your grade level, how clear are the social studies objectives in identifying for you what should be taught?	Very Clear	9%	29%	42%
		Clear	73%	48%	54%
		Unclear	18%	24%	4%
		Very Unclear	0%	0%	0%
7.	To what degree are you personally committed to the theme?	Great Degree	--	--	81%
		Good Degree	--	--	19%
		Some Degree	--	--	0%
		Not At All	--	--	0%
8.	The principal has provided the support I need to successfully implement the magnet theme at the school?	Strongly Agree	--	26%	78%
		Agree	--	9%	19%
		Disagree	--	35%	4%
		Strongly Disagree	--	30%	0%
9.	The instructional assistant has provided the support I need to successfully implement the magnet theme at the school?	Strongly Agree	--	25%	52%
		Agree	--	13%	33%
		Disagree	--	38%	15%
		Strongly Disagree	--	25%	0%
10.	The science resource teachers have provided the support I need to successfully implement the magnet theme at this school?	Strongly Agree	31%	38%	42%
		Agree	42%	29%	23%
		Disagree	19%	13%	23%
		Strongly Disagree	8%	21%	12%

Table 11 (continued)

Knotts Teacher Responses to Program Perception Items
1989- 1991

Items		Response Alternatives	1988-89	1989-90	1990-91
11.	Communication among faculty/staff is	Excellent	--	--	30%
		Good	--	--	48%
		Average	--	--	19%
		Fair	--	--	0%
		Poor	--	--	4%
12.	Communication between faculty/staff and administration is	Excellent	--	--	44%
		Good	--	--	37%
		Average	--	--	15%
		Fair	--	--	0%
		Poor	--	--	4%
13.	Communication between faculty/staff and students is	Excellent	--	--	37%
		Good	--	--	41%
		Average	--	--	19%
		Fair	--	--	4%
		Poor	--	--	0%
14.	Communication between faculty/staff and parents is	Excellent	--	--	27%
		Good	--	--	46%
		Average	--	--	23%
		Fair	--	--	4%
		Poor	--	--	0%
15.	Discipline at Knotts is	Excellent	--	--	4%
		Good	--	--	37%
		Average	--	--	33%
		Fair	--	--	19%
		Poor	--	--	7%
16.	Disciplinary support by administration at Knotts is	Excellent	--	--	56%
		Good	--	--	37%
		Average	--	--	4%
		Fair	--	--	4%
		Poor	--	--	0%
17.	Overall, what rating would you give Knotts this year?	Excellent	8%	11%	35%
		Good	16%	21%	54%
		Average	24%	21%	8%
		Fair	28%	37%	4%
		Poor	24%	11%	0%
18.	Do you engage in more environmentally sound activities in your own personal life as a result of increased knowledge about environmental issues gained through your experiences at an environmental science magnet?	Yes	--	78%	100%
		No	--	22%	0%

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2) poor quality or absence of field trips at some grade levels (32%); and 3) the science resource teachers (23%).

Twenty-four teachers offered suggestions for improving the program for the next year. Suggestions varied quite a bit, but the responses made by at least 10% of the teachers included the following: 1) provide early planning and organization of field trip schedule (33%); 2) get faculty/staff to work together, as a group and by grade level, to plan and coordinate objectives, curriculum, discipline plan, field trips etc. (33%); 3) specific suggestions were made by 22% of the teachers for theme related activities to improve implementation (to be provided to building administration); 4) increase science lab and science resource teacher time (15%).

School administration and instructional support staff. The administration and instructional support staff also responded to questions asking them to list program strengths, weaknesses, and suggestions for improvement. Strengths mentioned by more than one of the five persons responding included the principal and instructional assistant (80%) and the cooperative attitude of the faculty/staff and administration (60%). One hindrance to implementation mentioned by more than one person was the late hiring of the resource teachers (40%). Two suggestions were made by more than one person. Forty percent of the respondents said that the school needs a van for transportation of students and equipment for the field and camping trips and that a full-time nurse should be assigned to the building.

Parents. Sixty-three Knotts parents were randomly chosen to be interviewed by phone during the spring of 1991. Results of the survey appear in Table 12. The actual number of respondents for each item varies between 54 and 63 because some parents did not respond or had no opinion on some items. The first nine items are associated with the environmental science program implementation or aspects of education at the building level, the next five items are related to parent involvement with the school and their child's education, and the final eight items refer to whole district issues related to magnet implementation. Results of the survey reveal that a large majority of parents responded very positively to most questions. There were no areas which elicited a majority of negative responses. One-hundred percent of the parents said that overall they were satisfied with the school (item 7). Ninety-seven percent of responding parents were satisfied with the progress their child had made in the environmental science theme (item 3). Ninety-six percent said they believe the principal of Knotts has been responsive to their concerns (item 5). Ninety-three percent of parents said that they were satisfied with their child's teachers, thought that communications from the school were clear

Table 12

KnottsParent Survey Responses to Program Perception Items

Spring 1991

Item		Response Alternatives	(N = 63)
1.	Do you believe your child is acting in a more environmentally responsible way since attending Knotts?	Yes No	74% 26%
2.	Has your child made your family more environmentally aware, encouraging you to act more environmentally responsible through recycling, etc.	Yes No	74% 26%
3.	Are you satisfied with the progress your child has made in the environmental science theme?	Yes No	97% 3%
4.	Are you satisfied with the progress your child has made in basic courses(i.e. reading and math?	Yes No	90% 10%
5.	Overall, do you believe that the principal of Knotts has been responsive to your concerns?	Yes No	96% 4%
6.	Overall, are you satisfied with your child's teachers?	Yes No	93% 7%
7.	Overall, are you satisfied with Knotts?	Yes No	100% 0%
8.	Have communications from school like newsletters, notes, or phone calls been understandable and helpful?	Yes No	93% 7%
9.	Would you recommend Knotts to other parents?	Yes No	93% 7%
10.	Have you met your child's teachers for this year?	Yes No	94% 7%
11.	Do you believe your participation as a parent is welcome at Knotts (e.g. at SAC, as a volunteer, etc.)	Yes No	98% 2%
12.	Did you attend the last parent/teacher conference?	Yes No	60% 40%
13.	Do you attend SAC meetings?	Often Occasionally Never	8% 26% 66%
14.	How often have you worked on homework assignments with your child this school year?	everyday 2-3 days/week occasionally never	39% 32% 27% 2%
15.	Do you live in the Kansas City, Missouri School District?	Yes No	98% 2%

Table 12 (continued)

Knotts Parent Survey Responses to Program Perception Items

Spring 1991

Item		Response Alternatives	(N = 63)
16.	Is Knotts your neighborhood school--the one your child would attend if there were no magnet schools?	Yes No	36% 64%
17.	When your child applied to Knotts was the application handled in a reasonable amount of time?	Yes No	91% 9%
18.	When you applied for a magnet school were you treated in a courteous and helpful manner?	Yes No	85% 15%
19.	Do you think the way students were chosen for magnet schools was fair?	Yes No	59% 41%
20.	Does your child use district provided bus or taxi transportation?	Yes No	97% 3%
21.	Do you believe the school bus or taxi takes your child to school and back in a reasonable amount of time?	Yes No	86% 14%
22.	Do you believe the school bus or taxi provides safe transportation for your child?	Yes No	90% 10%

Note: Data are from phone surveys of Knotts parents in Spring of 1991. Actual number of respondents varied between 54 and 63 as some parents did not choose to answer all questions. Questions 21 and 22 were based solely on answers of parents who stated that their child used district transportation (N= 61).

and helpful, and would recommend Knotts to other parents (items 6, 8, and 9 respectively). Ninety percent of respondents were satisfied with the progress their child had made in basic subjects (item 4), while 74% said they believed their child was acting in a more environmentally responsible way (item 1) and had made the family more environmentally aware, encouraging them to act more environmentally responsible (item 2). Ninety-four percent of parents said they had met their child's teachers (item 10) and 98% said they believed their participation as a parent was welcome at Knotts. Asked how often they worked on homework assignments with their child, 71% said everyday or 2-3 days/week (item 14). Sixty percent of parents said that they attended the last parent/teacher conference while only 34% said they attended School Advisory Council (SAC) meetings often or occasionally (items 12 and 13 respectively). Ninety-eight percent of responding parents said they live in the Kansas City, Missouri school district (item 15), but only 36% said that Knotts was the neighborhood school their child would attend if there were no magnet program (item 16). Asked about the magnet application process

91% of parents said their application to Knotts was handled in a reasonable amount of time (item 17), 85% said they were treated in a helpful and courteous manner during the application process (item 18), and 59% said they thought the way students were chosen for magnet schools was fair (item 19). Of the 61 parents who said their children use district provided transportation, 86% believe the bus or taxi takes their child to school and back in a reasonable amount of time and 90% believed the transportation was safe (items 21 and 22 respectively).

Students. One-hundred and four students from Knotts' grades one through five were surveyed in the spring of 1991. The results of the survey, shown in Table 13, were mostly positive. Items on which 90% or more of the students answered positively (yes) included the following: item 1) liked the field trips (98%); item 2) learned a lot on field trips (92%); item 3) learned a lot about science (98%); item 4) learned a lot about nature (91%); item 5) learned about taking care of nature and the world (97%); item 6) try to save energy more because of what was learned in school (91%); item 14) like science classes outdoors (91%). The item which elicited the least proportion of positive responses asked students if they thought their friends in other schools would like going to their school (item 16),to which students responded yes 72% of the time. To further examine degree of theme implementation and carry over of knowledge to attitudes and behaviors, third, fourth, and fifth graders from Knotts school were compared to randomly selected classes of third, fourth, and fifth graders from a demographically similar traditional school with historically high science scores. Results, presented in Table 14, show that Knotts students responded to eleven out of fourteen questions with a higher percent of answers reflecting greater environmental exposure, knowledge, or self-reported environmentally safe behaviors or attitudes (yes answers). Differences on those eleven questions ranged from one percent to 57%. The greatest differences between the schools were on the following items: item 12 asking if they learn about taking care of our environment in all classes--like reading, math, and art (Knotts 79% yes/Comparison 22% yes); item 14 asking if they like their science classes outdoors (Knotts 88% yes/Comparison 41% yes); item 13 asking if they like their science labs (Knotts 91% yes/Comparison 57% yes); item 3 asking if they learned a lot about science at school this year (Knotts 97% yes/Comparison 68% yes); and item 4 asking if they learned a lot of new things about nature (Knotts 88% yes/Comparison 67% yes). Differences between the two schools was found to be statistically significant at the .05 level on these five items in addition to items asking if they learned a lot about taking care of nature and the world around us, if they try to save energy more because of what they learned

Table 13

Knotts Student Questionnaire Responses to Program Perception Items
Spring 1991

Item	Response Alternatives	(N = 104)
1. Did you like the field trips you went on this year?	Yes	98%
	No	2%
2. Did you learn a lot on the field trips this year?	Yes	92%
	No	8%
3. Did you learn a lot about science at school this year?	Yes	98%
	No	2%
4. Did you learn a lot of new things about nature?	Yes	91%
	No	9%
5. Did you learn a lot about taking care of nature and the world around us?	Yes	97%
	No	3%
6. Do you try to save energy more because of what you learned in school?	Yes	91%
	No	9%
7. Do you try to litter less because of what you learned?	Yes	89%
	No	12%
8. Do you try to save water more because of what you learned in school?	Yes	87%
	No	14%
9. Do you save things to recycle--like cans or papers?	Yes	88%
	No	13%
10. Have you taught your family things you learned at school about taking care of the environment?	Yes	79%
	No	21%
11. Are there some things you learnd about at school that you and your family DO at home for the environment?	Yes	84%
	No	16%
12. Do you learn about taking care of our environment in all your classes--like reading, math, and art?	Yes	85%
	No	15%
13. Do you like your science labs?	Yes	89%
	No	11%
14. Do you like your science classes outdoors?	Yes	91%
	No	9%
15. Do you like going to your school?	Yes	85%
	No	15%
16. Do you think your friends in other schools would like to go to your school?	Yes	72%
	No	28%

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Table 14

Student Questionnaire Responses for students in Grades 3-5 at Knotts and a Traditional Comparison School Spring 1991

Item		Response Alternatives	Knotts (N = 65)	Comparison (N = 51)
1.	Did you like the field trips you went on this year?	Yes	99%	98%
		No	2%	2%
2.	Did you learn a lot on the field trips this year?	Yes	88%	90%
		No	12%	10%
3.	Did you learn a lot about science at school this year?	Yes	97%*	68%
		No	3%	32%
4.	Did you learn a lot of new things about nature?	Yes	88%*	67%
		No	12%	33%
5.	Did you learn a lot about taking care of nature and the world around us?	Yes	95%*	84%
		No	5%	16%
6.	Do you try to save energy more because of what you learned in school?	Yes	88%*	73%
		No	12%	28%
7.	Do you try to litter less because of what you learned?	Yes	82%	94%*
		No	19%	6%
8.	Do you try to save water more because of what you learned in school?	Yes	86%*	69%
		No	14%	31%
9.	Do you save things to recycle--like cans or papers?	Yes	80%	75%
		No	20%	26%
10.	Have you taught your family things you learned at school about taking care of the environment?	Yes	74%	66%
		No	26%	34%
11.	Are there some things you learnd about at school that you and your family DO at home for the environment?	Yes	79%	80%
		No	22%	20%
12.	Do you learn about taking care of our environment in all your classes--like reading, math, and art?	Yes	79%*	22%
		No	22%	78%
13.	Do you like your science labs?	Yes	91%*	57%
		No	9%	43%
14.	Do you like your science classes outdoors?	Yes	88%*	41%
		No	12%	59%

Note: Classrooms of third, fourth and fifth graders were randomly selected from Knotts and a traditional comparison school with similar demographics.

* Differences are statistically significant at the .05 level using chi square analysis.

in school, and if they try to save water more because of what they learned in school (items 5, 6, and 8 respectively). Asked whether they learned a lot on field trips this year (item 2) and if there are things they learned about at school that they and their family do at home for the environment (item 11), the Comparison students answered yes two and one percent more of the time, respectively, than the Knotts students. Interestingly when asked whether they try to litter less because of what they had learned Comparison students answered yes 94% of the time, while Knotts students said yes 82% of the time, a statistically significant difference. Even with this exception, overall, the questionnaire results suggest that the environmental theme is being successfully implemented at Knotts and that the learning may be transferring to environmentally sound attitudes and behaviors outside the classroom.

Extended Day Program

Demographics

Enrollment in the Knotts Extended Day Program is summarized in Table 15. Because enrollment fluctuates during the year, the enrollment figures should be considered estimates. The table shows that enrollment in the before school component of the program was 22 with 64% of those being minority students. The number of students attending afternoon only was 82 with 88% minority and 12% non-minority students. Forty-eight students attended both morning and afternoon sessions with 92% of that number being minority. Seventy-eight percent of the total Knotts population is minority.

Table 15

Enrollment for Knotts Extended Day Program by Grade Time of Day, and Minority/Non-Minority Status 1990-1991

Attendance Time	Minority	Non-Minority	Total	% Minority
AM only	14	8	22	64%
PM only	72	10	82	88%
AM/PM both	44	4	48	92%
Total	130	22	152	86%

Implementation

The Extended Day before school component operated from 7:00 AM to 8:55 AM daily. During that time students could eat breakfast if they desired and participate in both academic and non-academic activities. Activity choices included such things as doing homework, playing with board games and puzzles, reading books, or listening to a teacher read a story.

The after school component of the program operated from 3:30 PM to 5:30 PM daily. The schedule included "mini-classes" which were held from 3:30 PM to 5:20 PM and include a variety of offerings as illustrated in Table 16.

Perceptions

Staff. In the spring of 1991, ten staff who work in the Extended Day Program responded to a questionnaire about the program. Results of the questionnaire, presented in Table 17, were mixed. One-hundred percent of the respondents said that they believed the program provided proper and adequate supervision to students (item 1), believed the program gave enough emphasis to academic activities (item 2), were satisfied with the time periods the program is offered (item 3), and thought that bus transportation for the program was reliable (item 8). Ninety percent of respondents said that they believed the program has a positive effect on student achievement (item 7), while 80% said that group size and age groupings are reasonable (item 6), the selection of individuals working in the program was fair (item 9), and that overall they would rate the Extended Day Program as good or excellent (item 12). Seventy percent of responding staff said that there is a well-defined program outlined to provide direction (item 4) and that there is a clear discipline code that is followed consistently (item

Table 16

Knotts Extended Day Mini-Classes and Activities

1990-91

Arts and Crafts	Drill Team	New History
Basketball	Fifth Grade Girls Club	Newspaper
Cheerleader Club	Game Day	Reading
Choir	Green Thumb Club	Reading/Writing
Computer	Jump Rope Fun	Roller Skating
Cooking	Math	Sewing
Creative Writing	Modern Movement	Show and Tell
Current Events	Music Appreciation	Softball
Drama Video	Nature Walk	

Table 17

Knotts Extended Day Teacher Questionnaire Responses
Spring 1991

Items		Response Alternatives	(N = 10)
1.	The Extended Day Program provides proper and adequate supervision to students?	Strongly Agree	40%
		Agree	60%
		Disagree	0%
		Strongly Disagree	0%
2.	The Extended Day Program gives enough emphasis to academic activities?	Strongly Agree	50%
		Agree	50%
		Disagree	0%
		Strongly Disagree	0%
3.	I am satisfied with the time periods the program is now offered.	Strongly Agree	70%
		Agree	30%
		Disagree	0%
		Strongly Disagree	0%
4.	There is a well-defined program out-lined for Extended Day that provides direction to the staff.	Strongly Agree	30%
		Agree	40%
		Disagree	30%
		Strongly Disagree	0%
5.	Extended day staff work closely with classroom teachers and administration to tie daily academics in the classroom to academic activities in Extended Day.	Strongly Agree	10%
		Agree	50%
		Disagree	20%
		Strongly Disagree	20%
6.	Group size and age groupings are reasonable.	Strongly Agree	60%
		Agree	20%
		Disagree	20%
		Strongly Disagree	0%
7.	I believe that the Extended Day Program has a positive effect on student achievement.	Strongly Agree	60%
		Agree	30%
		Disagree	10%
		Strongly Disagree	0%
8.	Bus transportation has been dependable ?	Strongly Agree	40%
		Agree	60%
		Disagree	0%
		Strongly Disagree	0%
9.	The selection of individuals working with the Extended Day Program has been fair.	Strongly Agree	30%
		Agree	50%
		Disagree	20%
		Strongly Disagree	0%
10.	There is a clear discipline code for the Extended Day Program that is followed consistently.	Strongly Agree	30%
		Agree	40%
		Disagree	30%
		Strongly Disagree	0%

Table 17 (continued)

Knotts Extended Day Teacher Questionnaire Responses in Spring 1991

Items		Response Alternatives	(N = 10)
11.	I have been able to get the materials I need for the Extended Day Program in a timely fashion.	Strongly Agree	11%
		Agree	44%
		Disagree	22%
		Strongly Disagree	22%
12.	Overall, what rating would you give the Extended Day Program?	Excellent	40%
		Good	40%
		Average	0%
		Fair	20%
		Poor	0%

10). Less positive are the figures showing that only 60% believe the program staff work closely with classroom teachers to tie daily academics in the classroom to those in the Extended Day Program (item 5) and that just 55% say that they have been able to get the materials needed for the Extended Day Program in a timely fashion (item 11).

Parents. Twenty-six parents who stated on a parent phone survey in spring 1991 that their child attended Extended Day were asked a series of questions about their perceptions of the program. The results of that survey are found in Table 18. Of the responding parents, 100% stated that they had learned about the program through information received directly from the school after enrolling rather than from other sources of advertising such as newspaper, radio, etc. (item 1). Asked the primary reason that their child attended the Extended Day Program, 31% said because the parent/guardian works, 35% said to help catch or keep up with school work, 31% said for the enrichment, and 4% gave other miscellaneous reasons (item 2). Ninety-one percent said they believe the program gives enough emphasis to academic activities (item 3), 100% that it gives proper supervision to students (item 4), and 96% that, overall, they were satisfied with the program (item 5).

Conclusions

In its third full year operation, the Knotts Environmental Science Magnet School has registered some significant accomplishments and shown some remarkable progress given some of the hurdles the school has faced. Demographic data summarized as of September 1990 show that Knotts, which began as a predominantly minority school, met its goal of

Table 18

Knotts Parent Questionnaire Responses to Extended Day Items
Spring 1991

Items	Response Alternatives	(N = 26)
1. How did you find out about the Extended Day Program?	Radio/TV	0%
	Newspaper	0%
	School	100%
	District	0%
	Other	0%
2. Does your child attend primarily because:	Parent/Guardian Works	31%
	Help Catch/Keep Up	35%
	Enrichment	31%
	Other	4%
3. Do you believe the Extended Day Program gives enough emphasis to academic activities?	Yes	91%
	No	9%
4. Do you believe the Extended Day Program gives proper supervision to students?	Yes	100%
	No	0%
5. Overall, have you been satisfied with the Extended Day Program?	Yes	96%
	No	4%

Note: Results are from a telephone survey of parents in Spring 1991.

approaching a 60/40 minority to non-minority split by at least 2% at each grade level, with the exception of kindergarten which, already approaching the desirable 60/40 ratio with 63% minority in 1990 dropped by one percentage point to 62% minority in 1991.

Site visits to Knotts revealed ample visible evidence of the implementation of the magnet theme. This evidence included such things as aquariums, animals (live and preserved), photographs, posters, mobiles, student work, etc. in the hallways and classrooms. Additional evidence of implementation was Knotts students' participation in numerous theme related field trips and activities, including camping experiences at every grade level. Classroom observations revealed that the theme is being infused across the curriculum with percent of class time spent on theme-related activities ranging from 47% in social studies to 78% in math. Interestingly, the teachers' self-reported degree of infusion in different subjects was the opposite of the level of infusion as measured in minutes during classroom observation. This may be due to differing perceptions of teachers as to what constitutes a "great degree" of infusion.

On the 1991 ITBS, Knotts students scored at or above the national norm (the 50th percentile) on all subtests in kindergarten and on all subtests except reading at first and second grade. Third grade students scored at or above the norm in language and science, while fourth and fifth grade students scored at or above the norm only in science. While scores went down across all subjects since 1990 in kindergarten and third grade and in every subject except social studies in first grade, fifth grade scores went up in every subject area. The greatest increases were in reading (from the 25th to the 39th percentile rank) and in science (from the 44th to the 51st percentile rank). Science is the only subject area in which students scored at or above the norm across all grade levels. Since 1988, the spring before the environmental science theme was implemented, there have been increases at all grade levels and in all subjects with the exception of first grade reading, second grade language, and fourth grade math and language. The greatest gains across all grade levels since 1988 have been in science with percentile raises averaging 22 and ranging from 15 in fourth grade to 39 in second grade. Scores also increased across all other subjects since 1988 with kindergarten and third grade scores rising most over the time period since theme implementation, averaging 16 percentile point increases across subjects. Second and fifth grades followed closely behind averaging 12 percentile point increases across subjects. ITBS scores for 1991 were compared to a randomly selected sample of students from the district's traditional schools. Knotts students' scores were statistically significantly higher in kindergarten math and language, in first grade language, science, and social studies, and in second grade science. Knotts scores were statistically significantly lower in fourth grade math and social studies.

On the MMAT, Knotts scores are comparable with the Kansas City, Missouri School District in math, but weak in the areas of reading/language arts, science, and social studies. Compared with the state, Knotts is weak in reading, math, science, and social studies. Since 1990, Knotts scores fell slightly in all subject areas except math. Overall, since the 1988 magnet theme implementation, reading scores fell by 2 points while social studies, math, and science scores rose by 14, 24, and 39 points respectively. The rise in social studies and science scores may be further evidence of theme implementation.

The perceptions of parents were positive with 100% saying that, overall, they were satisfied with the school. A great majority of parents self-reported high involvement with their child's education and high levels of satisfaction over areas related to the school, the magnet application process, and district provided transportation. Student perceptions were also very positive

with large majorities of students responding that they not only liked the program and were learning about most facets of it, but also that they were putting into practice many of the environmentally sound behaviors that they had learned. Comparison of third to fifth grade students from Knotts and a demographically similar traditional school supported other data that the environmental science theme was being implemented and suggested that students were being impacted by the program through changes in knowledge, attitudes, and behaviors that are more environmentally sound. Responses by teachers were mixed. On the positive side, more than one-half of the teachers responded positively to all items. Over 90% of teachers said they were committed to the theme, that they believed the principal was providing the support necessary for theme implementation, that they were familiar with the goals and objectives of the school planning outline, and that the school was implementing the theme according to those goals and objectives. There were some problem areas cited by a relatively large minority of teachers including problems with the field trips, a belief that science resource teachers were not providing the support the teachers felt they needed to implement the theme, and a dissatisfaction with the discipline.

Acting in response to past recommendations (Seever, 1990) Knotts has made an effort to ensure that there is continuing inservice in implementation and infusion of the theme across the curriculum and that all staff have an opportunity to participate in this training. The teacher questionnaire results appear to confirm some success in this area with 91% satisfaction with theme-centered inservice. An interim principal led the program for the first half of the year, getting approval to continue as principal at mid-year. There is evidence that the principal has worked with the area superintendent, faculty, and support staff to try and improve communication, provide opportunities for team building and staff input, and to nurture commitment to the theme when possible. The information provided by classroom observations and teacher perception data should be especially helpful to the administration in planning for future staff development and in identifying what issues need resolving in order to build a strong and cohesive team with a shared vision and commitment to successfully using the high interest theme to better provide educational opportunities to the Knotts students.

Based on the information in this report, the following general recommendations can be made:

1. It is important that the staff at Knotts continue to have the opportunity to receive training in the teaching of environmental science and infusion techniques throughout

the curriculum. Included should be information on careers related to the theme and how to effectively infuse the information into the courses and field trips.

2. The administration and faculty/staff should explore with faculty why there appears to be some dissatisfaction with the field trip process and what they can do to reach mutually agreeable solutions.

3. The administration and faculty should work together to formulate a viable discipline plan based on this year's experience with problems and successes in that area. Consensus should be reached and they should resolve as a group to consistently follow-through with the plan. Follow-up discussions should be scheduled during the 1991-92 year to evaluate the plan's effectiveness and adapt it accordingly.

4. The administration and instructional support staff should study the results of the classroom observation data and determine what, in their best judgement, should be considered for each subject area to be appropriate levels of infusion and instruction of problem solving/critical thinking skills. They should, in particular, determine in what way they can support the faculty in each subject area to best implement the theme and meet the goals and objectives of the school's planning outline. It would also be helpful to explore teachers' perceptions of infusion and what they believe are high, low, or appropriate levels for different subjects.

5. The administration and instructional support staff should use appropriate resources, such as the district testing office, to most optimally make use of the standardized test results to assess strengths and weaknesses in alignment of the curriculum for planning purposes.

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